1967

Structural concrete research at Lehigh University, projects-report-publications, July 1967, 1969

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237.42

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STRUCTURAL CONCRETE RESEARCH
AT
LEHIGH UNIVERSITY

Projects - Reports - Publications

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July 1967

STRUCTURAL CONCRETE RESEARCH
at
LEHIGH UNIVERSITY

This compilation includes a listing of research projects which have been conducted in the Fritz Laboratory of the Department of Civil Engineering. The projects included are either directly in the area of the structural behavior of concrete, or are in closely associated areas. The projects included would fall within the following categories: (1) plain, reinforced, and prestressed concrete, (2) composite construction, (3) beam-slab bridges, (4) concrete pavements, (5) shell roof construction, (6) wire, wire rope, and wire strand, and (7) brick assemblages.

Part I contains a list of all projects which have been conducted in the seven categories. Part II is a compilation of all reports associated with the particular projects which have been active primarily in the period 1952-1967. Finally, Part III consists of a list of the publications which have been based on the work associated with the projects listed in Part II.

PART I - RESEARCH PROJECTS

The projects are listed in numerical order. The current projects are Nos. 223, 309, 315, 322, 324, 338, and 339.

Project No.	Title
146	Concrete Column Investigation
147	Compression Strength of Concrete in Flexure
149	The Effects of a Clay Admixture on Concrete
151	Dunagan Buoyancy Apparatus
153	Shearing Strength of Reinforced Concrete Beams Having Bent-Up Bars
154	Quality and Economy of Concrete
156	Strength and Durability of Concrete Containing Different Aggregates
159	Quality of Concrete With Different Cements
160	Concrete Columns With High Percentage of Reinforcement
162	Reinforced Brick Columns
165	Photoelastic Studies
167	Shrinkage of Concrete
171	Stationary Wire Ropes in Tension and Bending
173	Reinforcing Bars in Slabs
176	Two-Way Reinforced Concrete Slabs
178	Effect of Plastic Flow on Strength of Reinforced Concrete
182	Tensile Strength of Concrete
183	Beams Reinforced With High Yield Strength Steels
184	Bond Strength of Rusted Bars

Project No.	Title
186	Balanced Design of Reinforced Concrete Beams
187	Fatigue Properties of Steel Wire
201	Vibration Tests of Wires and Cables
213	Shell Roof Construction
223	Prestressed Concrete Bridge Members
224	Research on Concrete Shrinkage
229	Prestressed Concrete Bond (Wires)
230	Prestressed Brick Beams
232	Bond of Prestressed Concrete (Strands)
234	Lightweight Prestressed Concrete Units
235	The Effect of Prestressing of Concrete Columns in the Elastic Range
239	Fatigue Tests of Prestressed Concrete Members Under Impact Loading
240	Dynamic Tests of Prestressed Concrete Railroad Slabs
246	Lateral Load Test of Brick Wall
252	Continuous Concrete Pavements (York)
255	Tests of Long Concrete Beams
256	Continuous Concrete Pavements
259	Creep and Plastic Flow of Lightweight Concrete
264	Influence Surfaces for Bridge Slabs
274	Maryland State Roads Commission Continuous Concrete Pavements
279	Composite Design for Buildings
282	Preflexed Beams
285	Fatigue of Composite Beams
289	Bar-Mat Lap Failures in Pavements
298	End Conditions in Pre-Tensioned Prestressed Concrete
306	Horizontal Shear Connection in Composite Concrete Beams
309	Bond Between Concrete and Prestressing Strand

Project No.	Title
315	Lateral Load Distribution on Concrete Bridges
316	Shear Connector Design for Highway Bridges
322	A Structural Model Study of Load Distribution in Highway Bridges
324	Static and Fatigue Behavior of Composite Beams
338	Multi-Story Structures Utilizing Composite Beams
339	Prestress Losses in Prestressed Concrete Flexural Members

PART II - REPORTS

The reports, listed in numerical order under each particular project, are of three basic types: (1) progress or project reports which are normally complete in description of the work performed, (2) published papers based on the results of the project work, and (3) M. S. theses and Ph.D. dissertations. In most cases, the progress or project reports are available in limited quantities on request, and likewise, most of the published papers are available in reprint form. Theses and dissertations are not generally available for distribution, but are available for reference.

The reports included in Part II are those associated with the following projects: 223, 229, 232, 235, 240, 252, 255, 256, 282, 289, 298, 306, 309, 315, 322, and 339. Reports on projects in the area of composite construction (steel beam - concrete slab) are not included. The project numbers for these projects are: 279, 285, 316, 324, and 338.

Project 223 PRESTRESSED CONCRETE BRIDGE MEMBERS

223.1 Mayo, R. and Lore, F.
A COMPARISON BETWEEN ORDINARY REINFORCED AND PRESTRESSED REINFORCED CONCRETE BEAMS, February 1952 (Progress Report No. 1)

223.2 Mayo, R.
TESTS OF PRE-TENSIONED, PRESTRESSED CONCRETE BEAM CONTAINING 5/16-IN. DIAMETER BONDED STRANDS, 1952 (Progress Report No. 2)

223.3 Smislova, A.
TEST OF A PRE-TENSIONED, PRESTRESSED CONCRETE BEAM, 1952 (Progress Report No. 3)

223.4 Smislova, A., Loewer, A. C., Jr., and Eney, W. J.
USING SR-4 GAGES TO MEASURE STRAINS IN WIRE STRAND, 1953 (Progress Report No. 4)
(Published: Product Engineering, April 1953)
(F. L. Reprint No. 88)

223.5 Knudsen, K. E. and Eney, W. J.
ENDURANCE OF A FULL-SCALE PRE-TENSIONED CONCRETE BEAM, April 1953 (Progress Report No. 5)

223.6 Smislova, A., Brown, D. H., Jr., Roesli, A., and Eney, W. J.
ENDURANCE OF A FULL-SCALE POST-TENSIONED CONCRETE MEMBER, May 1954 (Progress Report No. 6)

223.7 Brown, D. H.
BOND OF PRESTRESSED STRANDS, September 1953 (Progress Report No. 7)

223.8 Roesli, A., Loewer, A. C., Jr., and Eney, W. J.
MACHINE TO APPLY REPEATED LOADS TO LARGE FLEXURAL MEMBERS, February 1954 (Progress Report No. 8) (Published: American Society for Testing Materials, Bulletin No. 196, February 1954)
(F. L. Reprint No. 94)

Project 223 (Cont'd.)

223.9 Roesli, A., Smislova, A., Ekberg, C. E., Jr., and Eney, W. J.
FIELD TESTS ON A PRESTRESSED CONCRETE MULTI-BEAM BRIDGE, 1956 (Progress Report No. 9) (Published: Proceedings, Highway Research Board, Vol. 35, 1956)
(F. L. Reprint No. 117)

223.10 Roesli, A.
LATERAL LOAD DISTRIBUTION IN MULTI-BEAM BRIDGES, July 1955 (Progress Report No. 10)

223.11 Smislova, A.
STATIC TESTS ON PRESTRESSED CONCRETE BEAMS USING 7/16-IN. STRANDS, June 1955 (Progress Report No. 11)

223.12 Debly, L. J.
STATIC TESTS ON PRESTRESSED CONCRETE BEAMS USING 7/16-IN. STRANDS, September 1955 (Progress Report No. 12)

223.13 Debly, L. J.
STATIC TESTS ON PRESTRESSED CONCRETE BEAMS USING 7/16-IN. STRANDS, June 1956 (Progress Report No. 13)

223.14 Walther, R. E.
LATERAL LOAD DISTRIBUTION IN MULTI-BEAM BRIDGES, August 1956 (Progress Report No. 14)

223.15 Ekberg, C. E., Jr., Walther, R. E., and Slutter, R. G.
FATIGUE RESISTANCE OF PRESTRESSED CONCRETE BEAMS IN BENDING, April 1957 (Progress Report No. 15) (Published: Proceedings, American Society of Civil Engineers, Vol. 83, (ST4), 1957)
(F. L. Reprint No.)

223.16 Dinsmore, G. A. and Deutsch, P. L.
ANCHORAGE CHARACTERISTICS OF STRAND IN PRE-TENSIONED PRESTRESSED CONCRETE, July 1957 (Progress Report No. 16)

Project 223 (Cont'd.)

223.17 Walther, R. E.
THE ULTIMATE STRENGTH OF PRESTRESSED AND CONVENTIONALLY REINFORCED CONCRETE UNDER THE COMBINED ACTION OF MOMENT AND SHEAR, October 1957 (Progress Report No. 17)

223.17A Walther, R. E.
SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS, November 1957 (Progress Report No. 17A)

223.18 Walther, R. E. and Warner, R. F.
ULTIMATE STRENGTH TESTS OF PRESTRESSED AND CONVENTIONALLY REINFORCED CONCRETE BEAMS IN COMBINED BENDING AND SHEAR, September 1958 (Progress Report No. 18)

223.19 Dinsmore, G. A., Deutsch, P. L., and Montemayor, J. L.
ANCHORAGE AND BOND IN PRE-TENSIONED PRE-STRESSED CONCRETE MEMBERS, December 1958 (Progress Report No. 19)

223.20 Warner, R. F.
THE CALCULATION OF FLEXURAL STRESSES IN A PRESTRESSED CONCRETE MEMBER, November 1958 (Progress Report No. 20)

223.21 Lane, R. E. and Ekberg, C. E., Jr.
REPEATED LOAD TESTS ON 7-WIRE PRESTRESSING STRANDS, January 1959 (Progress Report No. 21)

223.22 McClarnon, F. M., Wakabayashi, M., and Ekberg, C. E., Jr.
FURTHER INVESTIGATION INTO THE SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS WITHOUT WEB REINFORCEMENT, January 1962 (Progress Report No. 22)

223.23 Nasser, K. W.
STATIC AND FATIGUE TESTS OF A 30 FOOT COMPOSITE PRESTRESSED CONCRETE BEAM, March 1961 (Progress Report No. 23)

Project 223 (Cont'd.)

223.24 Warner, R. F.
PROBABLE FATIGUE LIFE OF PRESTRESSED CONCRETE FLEXURAL MEMBERS, Ph.D. Dissertation, Lehigh University, September 1961

223.24A Warner, R. F. and Hulsbos, C. L.
PROBABLE FATIGUE LIFE OF PRESTRESSED CONCRETE FLEXURAL MEMBERS, July 1962 (Progress Report No. 24)

223.25 Hanson, J. M. and Hulsbos, C. L.
OVERLOAD BEHAVIOR OF PRESTRESSED CONCRETE BEAMS WITH WEB REINFORCEMENT, February 1963 (Progress Report No. 25)

223.26 Ople, F. S., Jr.
PROBABLE FATIGUE LIFE OF CONCRETE WITH STRESS GRADIENT, Ph.D. Dissertation, Lehigh University, September 1963

223.26A Ople, F. S., Jr. and Hulsbos, C. L.
PROBABLE LIFE OF PRESTRESSED BEAMS AS LIMITED BY CONCRETE FATIGUE, October 1963 (Progress Report No. 26)

223.26B Ople, F. S., Jr. and Hulsbos, C. L.
PROBABLE FATIGUE LIFE OF PLAIN CONCRETE WITH STRESS GRADIENT, December 1963
(Published: Journal of the American Concrete Institute, Vol. 63, January 1966)
(F. L. Reprint No. 295)

223.27 Hanson, J. M. and Hulsbos, C. L.
ULTIMATE SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS WITH WEB REINFORCEMENT, April 1965 (Progress Report No. 27)

223.27A Hanson, J. M. and Hulsbos, C. L.
ULTIMATE SHEAR TESTS OF PRESTRESSED CONCRETE I-BEAMS UNDER CONCENTRATED AND UNIFORM LOADINGS, September 1963 (Published: Journal of the Prestressed Concrete Institute, Vol. 9, No. 3, June 1964)
(F. L. Reprint No. 256)

Project 223 (Cont'd.)

223.27B Hanson, J. M.
ULTIMATE SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS WITH WEB REINFORCEMENT, Ph.D. Dissertation, Lehigh University, 1964

223.28 Brecht, H. E., Hanson, J. M., and Hulsbos, C. L.
ULTIMATE SHEAR TESTS OF FULL-SIZED PRESTRESSED CONCRETE BEAMS, December 1965 (Progress Report No. 28)

223.28A Brecht, H. E.
ULTIMATE SHEAR TESTS OF FULL-SIZED PRESTRESSED CONCRETE BEAMS, M. S. Thesis, Lehigh University, 1965

Project 223 (Cont'd.)

223 Ekberg, C. E., Jr.
SUMMARY ON PRESTRESSED CONCRETE PROGRAM AT LEHIGH UNIVERSITY, Proceedings, World Conference on Prestressed Concrete, San Francisco, July 1957
(F. L. Reprint No. 175)

223.S4 Ekberg, C. E., Jr., Walther, R. E., and Slutter, R. G.
FATIGUE RESISTANCE OF PRESTRESSED CONCRETE BEAMS IN BENDING, Proceedings, American Society of Civil Engineers, Vol. 83 (ST4), 1957
(F. L. Reprint No.)

223.S6 Slutter, R. G. and Ekberg, C. E., Jr.
STATIC AND FATIGUE TESTS ON PRESTRESSED CONCRETE RAILWAY SLABS, American Railway Engineering Association Bulletin, Vol. 60, No. 544, June-July 1958
(F. L. Reprint No. 131)

223.S7 Walther, R. E.
THE SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS, Proceedings, Third Congress, Federation Internationale de la Precontrainte, Berlin, 1958
(F. L. Reprint No. 129)

223.S8 Ekberg, C. E., Jr. and Warner, R. F.
PRESTRESSED CONCRETE RESEARCH AT LEHIGH UNIVERSITY, 1952-58, March 1959

223.S9 Nasser, K. W. and Ekberg, C. E., Jr.
STATIC AND FATIGUE TEST OF A 70-FOOT COMPOSITE PRESTRESSED CONCRETE BEAM, April 1959

223.S10 Assimocoupolos, B., Warner, R. F., and and Ekberg, C. E., Jr.
HIGH SPEED FATIGUE TESTS ON SMALL SPECIMENS OF PLAIN CONCRETE, Journal of the Prestressed Concrete Institute, September 1959
(F. L. Reprint No. 173)

Project 229 — PRESTRESSED CONCRETE BOND (WIRES)

229 — El-Khuri, S. K.
BOND IN PRESTRESSED CONCRETE, July 1952

229.1 — Buenaventura, C. V.
BOND OF WIRES IN PRESTRESSED CONCRETE, December 1953

Project 232 — BOND OF PRESTRESSED CONCRETE (STRANDS)

232.2 — Brown, D. H.
BOND OF PRESTRESSED STRANDS, September 1953

Project 235 — THE EFFECT OF PRESTRESSING OF CONCRETE COLUMNS IN THE ELASTIC RANGE

235.1 — Spalding, G. R.
THE EFFECT OF PRESTRESS ON ELASTIC COLUMNS, June 1954

Project 240 — DYNAMIC TESTS OF PRESTRESSED CONCRETE RAILROAD SLABS

240S.6 — Slutter, R. G. and Ekberg, C. E., Jr.
STATIC AND FATIGUE TESTS ON PRESTRESSED CONCRETE RAILWAY SLABS, American Railway Engineering Association Bulletin, Vol. 60, No. 544, June-July 1958
(F. L. Reprint No. 131)

Project 252 CONTINUOUS CONCRETE PAVEMENTS (YORK)

252.1 Schiffman, R. L., Taylor, I. J., and Eney, W. J.
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT RESEARCH IN PENNSYLVANIA, Highway Research Board Bulletin No. 181, January 1957
(F. L. Reprint No. 126)

252.2 Project Staff
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT RESEARCH FOR AMERICAN IRON AND STEEL INSTITUTE, Fritz Engineering Laboratory, Lehigh University, 1958

Project 255 — TESTS OF LONG CONCRETE BEAMS

255.1 Ekberg, C. E., Jr.
TEST OF A 70-FOOT PRESTRESSED PRE-TENSIONED CONCRETE BEAM, September 1956

255.2 Ekberg, C. E., Jr.
DYNAMIC TESTS OF A 55-FOOT AMDEK BRIDGE MEMBER, March 1956

Project 256 — CONTINUOUS CONCRETE PAVEMENTS

256.1 Schiffman, R. L.
LITERATURE SURVEY ON RESEARCH IN CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS, 1957

256.2 Shieh, Ying-Jer
THEORETICAL ANALYSIS OF SPECIAL PROBLEMS ON THE CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS, 1958

256.3 Taylor, I. J. and Eney, W. J.
FIRST YEAR PERFORMANCE REPORT ON CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS IN PENNSYLVANIA, Highway Research Board Bulletin No. 214, 1959
(F. L. Reprint No. 143)

256.4 Yerlici, V. A.
AN EXPERIMENTAL STUDY ON THE INFLUENCE OF CONTINUOUS REINFORCEMENT ON THE CRACK PATTERN OF LONG CONCRETE PAVEMENTS, 1958

256.5 Taylor, I. J.
DEVELOPMENT OF CONTINUOUSLY REINFORCED CONCRETE HIGHWAY PAVEMENTS IN THE U. S., 1958

256.6 Yerlici, V. A.
NOTES ON THE POSSIBLE BAUSCHINGER EFFECT ON THE REINFORCEMENT STEEL IN A CONTINUOUSLY REINFORCED CONCRETE PAVEMENT, 1958

Project 256 (Cont'd.)

256.7 Crabtree, A.
THE SIGNIFICANCE OF TRANSVERSE CRACKS IN CONTINUOUSLY REINFORCED CONCRETE PAVEMENT, 1958

256.8 Taylor, I. J. and Eney, W. J.
OBSERVATION IN THE BEHAVIOR OF CONTINUOUSLY REINFORCED CONCRETE PAVEMENT IN PENNSYLVANIA, 1958

256.9 Taylor, I. J., Liebig, J. O., Jr., and Eney, W. J.
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT ON U. S. ROUTE 22, BERKS COUNTY, PENNSYLVANIA, February 1962

256.10 Cooper, Peter B.
REINFORCEMENT OVERLAP TESTS, September 1960

256.11 Taylor, I. J.
EXPERIMENTAL PAVEMENT ON U. S. ROUTE 111 IN YORK COUNTY, PENNSYLVANIA, March 1962

256.12 Kocaoglu, Dundar
AN INVESTIGATION OF OVERLAP FAILURES IN CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS, 1962

256.13 Taylor, I. J.
SUPPLEMENTAL REPORT ON THE HAMBURG PROJECT, 1962

Project 282 PREFLEXED BEAMS

282.1 Errera, S. J., Pitts, C. P., and Haines, D. W.
TESTS OF PREFLEXED BEAMS, September 1961

Project 289 BAR-MAT LAP FAILURES IN PAVEMENTS

289.1 Adams, R. G. and VanHorn, D. A.
REINFORCEMENT LAP FAILURES, September 1964

Project 298

END CONDITIONS IN PRE-TENSIONED PRESTRESSED CONCRETE

298.2 Miller, D. M. and Hulsbos, C. L.
AN INVESTIGATION OF CRACK OCCURRENCE IN THE END REGIONS OF PRE-TENSIONED PRESTRESSED CONCRETE BEAMS, February 1964

Project 306

HORIZONTAL SHEAR CONNECTION IN COMPOSITE CONCRETE BEAMS

306.1 Badoux, J. C. and Hulsbos, C. L.
HORIZONTAL SHEAR CONNECTION IN COMPOSITE CONCRETE BEAMS UNDER REPEATED LOADING, August 1965

306.1T Badoux, J. C.
HORIZONTAL SHEAR CONNECTION IN COMPOSITE CONCRETE BEAMS UNDER REPEATED LOADING, Ph.D. Dissertation, Lehigh University, 1965

Project 309

BOND BETWEEN CONCRETE AND PRESTRESSING STRAND

309.1 Badaliance, R. and VanHorn, D. A.
ULTIMATE FLEXURAL BOND IN BEAMS PRE-TENSIONED WITH HIGH STRENGTH STRAND, February 1966

309.1T Badaliance, R.
ULTIMATE FLEXURAL BOND BETWEEN CONCRETE AND PRESTRESSING STRAND, M. S. Thesis, Lehigh University, 1965

309.2 Tide, R. H. R. and VanHorn, D. A.
A STATISTICAL STUDY OF THE STATIC AND FATIGUE PROPERTIES OF HIGH STRENGTH PRESTRESSING STRAND, June 1966

309.2T Tide, R. H. R.
A STATISTICAL STUDY OF THE STATIC AND FATIGUE PROPERTIES OF HIGH STRENGTH PRESTRESSING STRAND, M. S. Thesis, Lehigh University, 1966

309.3 Cowen, S. H. and VanHorn, D. A.
END SUPPORT EFFECTS ON ULTIMATE FLEXURAL BOND IN PRE-TENSIONED BEAMS, January 1967

309.3T Cowen, S. H.
END SUPPORT EFFECTS ON ULTIMATE FLEXURAL BOND IN PRE-TENSIONED BEAMS, M. S. Thesis, Lehigh University, 1967

309.4 Adams, R. G. and VanHorn, D. A.
REPEATED LOAD EFFECTS ON ULTIMATE FLEXURAL BOND IN PRE-TENSIONED FLEXURAL MEMBERS

Project 315

LATERAL LOAD DISTRIBUTION ON CONCRETE BRIDGES

315.1 Douglas, W. J. and VanHorn, D. A.
LATERAL DISTRIBUTION OF STATIC LOADS IN A PRESTRESSED CONCRETE BOX-BEAM BRIDGE - DREHERSVILLE BRIDGE, August 1966

315.1T Douglas, W. J.
LATERAL DISTRIBUTION OF STATIC LOADS IN A PRESTRESSED CONCRETE BOX-GIRDER BRIDGE, M. S. Thesis, Lehigh University, 1966

315.2 Guilford, A. A. and VanHorn, D. A.
LATERAL DISTRIBUTION OF DYNAMIC LOADS IN A PRESTRESSED CONCRETE BOX-BEAM BRIDGE - DREHERSVILLE BRIDGE, February 1967

315.3 Kilmer, R. H.
LOAD DISTRIBUTION IN BOX-BEAM BRIDGES - COMPUTER DESIGN OF PRESTRESSED CONCRETE MEMBERS, M. S. Thesis, Lehigh University, 1966

315.4 Guilford, A. A. and VanHorn, D. A.
LATERAL DISTRIBUTION OF VEHICULAR LOADS IN A PRESTRESSED CONCRETE BOX-BEAM BRIDGE - BERWICK BRIDGE

315.4ST Varney, R. F.
THE DYNAMIC BEHAVIOR OF A SINGLE SPAN PRESTRESSED CONCRETE BOX-BEAM HIGHWAY BRIDGE, Report, C.E. 406, July 1966

Project 322

A STRUCTURAL MODEL STUDY OF LOAD DISTRIBUTION IN HIGHWAY BRIDGES

No reports to date.

Project 339

PRESTRESS LOSSES IN PRESTRESSED CONCRETE FLEXURAL MEMBERS

No reports to date.

PART III - PUBLICATIONS

The publications are listed in chronological order, and include all published papers based on the projects listed in Part II. Reprints are available in limited quantities on request. After each reference, a Fritz Laboratory reprint number is given.

PUBLICATIONS

1952 - 1967

The publications are listed in chronological order.

Smislova, A., Loewer, A. C., Jr., and Eney, W. J.
USING SR-4 GAGES TO MEASURE STRAINS IN WIRE STRAND, Product Engineering, Vol. 24, No. 4, April 1953
(F. L. Reprint No. 88)

Roesli, A., Loewer, A. C., Jr., and Eney, W. J.
MACHINE TO APPLY REPEATED LOADS TO LARGE FLEXURAL MEMBERS, American Society for Testing Materials, Bulletin No. 196, February 1954
(F. L. Reprint No. 94)

Ekberg, C. E., Jr.
THE CHARACTERISTICS OF PRESTRESSED CONCRETE UNDER REPETITIVE LOADING, Journal of the Prestressed Concrete Institute, Vol. 1, No. 3, December 1956
(F. L. Reprint No.)

Roesli, A., Smislova, A., Ekberg, C. E., Jr., and Eney, W. J.
FIELD TESTS ON A PRESTRESSED CONCRETE MULTI-BEAM BRIDGE, Proceedings, Highway Research Board, Vol. 35, 1956
(F. L. Reprint No. 117)

Roesli, A. and Walther, R. E.
THE ANALYSIS OF PRESTRESSED MULTI-BEAM BRIDGES AS ORTHOTROPIC PLATES, Proceedings, World Conference on Prestressed Concrete, San Francisco, July 1957
(F. L. Reprint No. 130)

Ekberg, C. E., Jr.
SUMMARY ON PRESTRESSED CONCRETE PROGRAM AT LEHIGH UNIVERSITY, Proceedings, World Conference on Prestressed Concrete, San Francisco, July 1957
(F. L. Reprint No. 175)

Janney, J. L. and Eney, W. J.
FULL SCALE TEST OF BRIDGE ON NORTHERN ILLINOIS TOLL HIGHWAY, Proceedings, World Conference on Prestressed Concrete, San Francisco, July 1957
(F. L. Reprint No. A37)

Ekberg, C. E., Jr., Walther, R. E., and Slutter, R. G.
FATIGUE RESISTANCE OF PRESTRESSED CONCRETE BEAMS IN BENDING, Proceedings, American Society of Civil Engineers, Vol. 83 (ST4), 1957
(F. L. Reprint No.)

Knudsen, K. E. and Eney, W. J.
ENDURANCE OF A FULL SCALE PRE-TENSIONED CONCRETE BEAM, Proceedings, Highway Research Board, Vol. 36, 1957
(F. L. Reprint No. 105)

Schiffman, R. L., Taylor, I. J., and Eney, W. J.
PRELIMINARY REPORT ON CONTINUOUSLY REINFORCED CONCRETE PAVEMENT RESEARCH IN PENNSYLVANIA, Highway Research Board Bulletin No. 181, 1957
(F. L. Reprint No. 126)

Walther, R. E.
INVESTIGATION OF MULTI-BEAM BRIDGES, Journal of the American Concrete Institute, Vol. 54, December 1957
(F. L. Reprint No. 128)

Walther, R. E.
SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS, Proceedings, Third Congress, Federation Internationale de la Precontrainte, Berlin, 1958
(F. L. Reprint No. 129)

Ekberg, C. E., Jr., Walther, R. E., and Slutter, R. G.
Closure on: FATIGUE RESISTANCE OF PRESTRESSED CONCRETE BEAMS IN BENDING, Proceedings, American Society of Civil Engineers, Vol. 84 (ST4), 1958
(F. L. Reprint No. 142)

Assimacopoulos, B. M., Warner, R. F., and Ekberg, C. E., Jr.
HIGH SPEED FATIGUE TESTS ON SMALL SPECIMENS OF PLAIN CONCRETE, Journal of the Prestressed Concrete Institute, Vol. 4, No. 2, September 1959
(F. L. Reprint No. 173)

Slutter, R. G. and Ekberg, C. E., Jr.
STATIC AND FATIGUE TESTS ON PRESTRESSED CONCRETE RAILWAY SLABS, American Railway Engineering Association Bulletin, Vol. 60, No. 544, June-July 1958
(F. L. Reprint No. 131)

Taylor, I. J. and Eney, W. J.
FIRMES CONTINUOUS DE HORMIGON ARMADO (Development of Continuously Reinforced Concrete Highway Pavements), Informes de la Construccion, Spain, November 1959
(F. L. Reprint No. 214)

Taylor, I. J. and Eney, W. J.
FIRST YEAR PERFORMANCE REPORT ON CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS IN PENNSYLVANIA, Highway Research Board Bulletin No. 214, 1959
(F. L. Reprint No. 143)

Taylor, I. J. and Eney, W. J.
OBSERVATIONS ON THE BEHAVIOR OF CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS IN PENNSYLVANIA, Highway Research Board Bulletin No. 238, 1959
(F. L. Reprint No. 159)

Warner, R. F.
RESEARCH ON FATIGUE AND SHEAR IN PRESTRESSED CONCRETE, Journal of the Prestressed Concrete Institute, Vol. 5, No. 2, June 1960
(F. L. Reprint No.)

Warner, R. F.
Discussion of: SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS, Transactions, American Society of Civil Engineers, Vol. 125, 1960
(F. L. Reprint No. 169)

Warner, R. F. and Hulsbos, C. L.
PROBABLE FATIGUE LIFE OF UNDER-REINFORCED PRESTRESSED CONCRETE BEAMS, International Association of Bridge and Structural Engineers, IABSE Publications, Vol. 22, 1962
(F. L. Reprint No. 234)

Taylor, I. J.
Discussion of: L.T.S. DESIGN OF CONTINUOUSLY REINFORCED CONCRETE PAVEMENT, B. McCollough and W. Eddbetter, Transactions, American Society of Civil Engineers, Vol. 127, Part IV, 1962
(F. L. Reprint No. 213)

Hulsbos, C. L.
LATERAL DISTRIBUTION OF LOAD IN MULTI-BEAM BRIDGES -- A SUMMARY OF RESEARCH AT LEHIGH UNIVERSITY, Highway Research Board Bulletin No. 339, 1962 (presented at Highway Research Board, January 1962)
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Hanson, J. M. and Hulsbos, C. L.
ULTIMATE SHEAR TESTS OF PRESTRESSED CONCRETE I-BEAMS UNDER CONCENTRATED AND UNIFORM LOADINGS, Journal of the Prestressed Concrete Institute, Vol. 9, No. 3, June 1964
(F. L. Reprint No. 256)

Nasser, K. W.
DESIGN PROCEDURE FOR LATERAL LOAD DISTRIBUTION IN MULTI-BEAM BRIDGES, Journal of the Prestressed Concrete Institute, Vol. 10, No. 4, August 1965
(F. L. Reprint No.)

Hanson, J. M. and Hulsbos, C. L.
OVERLOAD BEHAVIOR OF PRE-TENSIONED PRESTRESSED CONCRETE I-BEAMS WITH WEB REINFORCEMENT, Highway Research Board, Highway Research Record No. 76 (presented at Highway Research Board, January 1964)
(F. L. Reprint No.)

Hanson, J. M. and Hulsbos, C. L.
FATIGUE TESTS OF TWO PRESTRESSED CONCRETE I-BEAMS WITH INCLINED CRACKS, Highway Research Board, Highway Research Record No. 103 (presented at Highway Research Board, January 1965)
(F. L. Reprint No.)

Ople, F. S., Jr. and Hulsbos, C. L.
PROBABLE FATIGUE LIFE OF PLAIN CONCRETE WITH STRESS GRADIENT, Journal of the American Concrete Institute, Vol. 63, January 1966
(F. L. Reprint No. 295)

Warner, R. F. and Hulsbos, C. L.
FATIGUE PROPERTIES OF PRESTRESSING STRAND, Journal of the Prestressed Concrete Institute, Vol. 11, No. 1, February 1966
(F. L. Reprint No.)

Warner, R. F. and Hulsbos, C. L.
PROBABLE FATIGUE LIFE OF PRESTRESSED CONCRETE BEAMS, Journal of the Prestressed Concrete Institute, Vol. 11, No. 2, April 1966
(F. L. Reprint No.)

Department of Civil Engineering
Fritz Engineering Laboratory

STRUCTURAL CONCRETE RESEARCH
AT
LEHIGH UNIVERSITY

Projects - Reports - Publications

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October 1969

FOREWORD

This compilation contains a listing of research endeavors in structural concrete and related areas, conducted by the Civil Engineering faculty and staff at the Fritz Engineering Laboratory of Lehigh University. The subjects of these research efforst may be grouped into seven categories as follows: (1) plain, reinforced and prestressed concrete, (2) composite construction, (3) beam-slab type bridges, (4) concrete pavements, (5) shell roof construction, (6) wire, wire rope, and wire strand, and (7) brick assemblages.

In Part I of this report are listed all projects which have been conducted in the seven categories since 1921. Part II is a compilation of reports associated with those projects which have been active primarily after 1952. Part III consists of a list of publications which have been based on the work performed under the projects listed in Part II.

PART I - RESEARCH PROJECTS

The projects are listed in numerical order. The current projects are Nos. 223, 309, 315, 322, 324, 338, 339, 349, 356, 359, and 360.

Project No.	Title
146	Concrete Column Investigation
147	Compression Strength of Concrete in Flexure
149	The Effects of a Clay Admixture on Concrete
151	Dunagan Buoyancy Apparatus
153	Shearing Strength of Reinforced Concrete Beams Having Bent-Up Bars
154	Quality and Economy of Concrete
156	Strength and Durability of Concrete Containing Different Aggregates
159	Quality of Concrete with Different Cements
160	Concrete Columns with High Percentage of Reinforcement
162	Reinforced Brick Columns
165	Photoelastic Studies
167	Shrinkage of Concrete
171	Stationary Wire Ropes in Tension and Bending
173	Reinforcing Bars in Slabs
176	Two-Way Reinforced Concrete Slabs
178	Effect of Plastic Flow on Strength of Reinforced Concrete
182	Tensile Strength of Concrete
183	Beams Reinforced with High Yield Strength Steels
184	Bond Strength of Rusted Bars
186	Balanced Design of Reinforced Concrete Beams

Project No.	Title
187	Fatigue Properties of Steel Wire
201	Vibration Tests of Wires and Cables
213	Shell Roof Construction
216	Concrete Capping Compounds
223	Prestressed Concrete Bridge Members
224	Research on Concrete Shrinkage
229	Prestressed Concrete Bond (Wires)
230	Prestressed Brick Beams
232	Bond of Prestressed Concrete (Strands)
234	Lightweight Prestressed Concrete Units
235	The Effect of Prestressing of Concrete Columns in the Elastic Range
239	Fatigue Tests of Prestressed Concrete Members Under Impact Loading
240	Dynamic Tests of Prestressed Concrete Railroad Slabs
246	Lateral Load Test of Brick Wall
252	Continuous Concrete Pavements (York)
255	Tests of Long Concrete Beams
256	Continuous Concrete Pavements
259	Creep and Plastic Flow of Lightweight Concrete
264	Influence Surfaces for Bridge Slabs
274	Maryland State Roads Commission Continuous Concrete Pavements
279	Composite Design for Buildings
282	Preflexed Beams
285	Fatigue of Composite Beams
289	Bar-Mat Lap Failures in Pavements
298	End Conditions in Pre-Tensioned Prestressed Concrete
306	Horizontal Shear Connection in Composite Concrete Beams
309	Bond Between Concrete and Prestressing Strand
315	Lateral Load Distribution in Prestressed Concrete Box-Beam Bridges

Project No.	Title
316	Shear Connector Design for Highway Bridges
322	A Structural Model Study of Load Distribution in Highway Bridges
324	Static and Fatigue Behavior of Composite Beams
338	Multi-Story Structures Utilizing Composite Beams
339	Prestress Losses in Pre-Tensioned Concrete Structural Members
349	Lateral Distribution of Load for Bridges Constructed with Prestressed Concrete I-Beams
356	Application of Limit Analysis to Two and Three Dimensional Problems in Metals, Soils, and Concrete
359	Development of Design Criteria for Continuous Composite Steel-Concrete Bridges
360	Design Procedures for Composite Beams with Lightweight Construction

PART II - REPORTS

The reports, listed in numerical order under each particular project, are of three basic types: (1) progress or project reports which are normally complete in description of the work performed, (2) published papers based on the results of the project work, and (3) reports by graduate students for partial fulfillment of course or degree requirements. In most cases, the progress or project reports are available in limited quantities on request, and likewise, most of the published papers are available in reprint form. Graduate student reports, theses, and dissertations are not generally available for distribution, but are available for reference.

The reports included in this part are those associated with projects which have been active in recent years since 1952. These include the following projects: 223, 229, 232, 235, 240, 252, 255, 256, 279, 282, 285, 289, 298, 306, 309, 315, 316, 322, 324, 338, 339, 349, 356, 359, and 360.

Project 223 — PRESTRESSED CONCRETE BRIDGE MEMBERS

223.1 Mayo, R. and Lore, F.
A COMPARISON BETWEEN ORDINARY REINFORCED AND PRESTRESSED REINFORCED CONCRETE BEAMS, February 1952 (Progress Report No. 1)

223.2 Mayo, R.
TESTS OF PRE-TENSIONED, PRESTRESSED CONCRETE BEAM CONTAINING 5/16-IN. DIAMETER BONDED STRANDS, 1952 (Progress Report No. 2)

223.3 Smislova, A.
TEST OF A PRE-TENSIONED, PRESTRESSED CONCRETE BEAM, 1952 (Progress Report No. 3)

223.4 Smislova, A., Loewer, A. C., Jr., and Eney, W. J.
USING SR-4 GAGES TO MEASURE STRAINS IN WIRE STRAND, 1953 (Progress Report No. 4) (Published: Product Engineering, April 1953)
(F. L. Reprint No. 53-7)

223.5 Knudsen, K. E. and Eney, W. J.
ENDURANCE OF A FULL-SCALE PRE-TENSIONED CONCRETE BEAM, April 1953 (Progress Report No. 5)

223.6 Smislova, A., Brown, D. H., Jr., Roesli, A., and Eney, W. J.
ENDURANCE OF A FULL-SCALE POST-TENSIONED CONCRETE MEMBER, May 1954 (Progress Report No. 6)

223.7 Brown, D. H.
BOND OF PRESTRESSED STRANDS, September 1953 (Progress Report No. 7)

223.8 Roesli, A., Loewer, A. C., Jr., and Eney, W. J.
MACHINE TO APPLY REPEATED LOADS TO LARGE FLEXURAL MEMBERS, February 1954 (Progress Report No. 8) (Published: American Society for Testing Materials, Bulletin No. 196, February 1954)
(F. L. Reprint No. 54-1)

223.9 Roesli, A., Smislova, A., Ekberg, C. E., Jr., and Eney, W. J.
FIELD TESTS ON A PRESTRESSED CONCRETE MULTI-BEAM BRIDGE, 1956 (Progress Report No. 9) (Published: Proceedings, Highway Research Board, Vol. 35, 1956)
(F. L. Reprint No. 56-7)

Project 223 (Cont'd.)

223.10 Roesli, A.
LATERAL LOAD DISTRIBUTION IN MULTI-BEAM BRIDGES, July 1955 (Progress Report No. 10)

223.11 Smislova, A.
STATIC TESTS ON PRESTRESSED CONCRETE BEAMS USING 7/16-IN. STRANDS, June 1955 (Progress Report No. 11)

223.12 Debly, L. J.
STATIC TESTS ON PRESTRESSED CONCRETE BEAMS USING 7/16-IN. STRANDS, September 1955 (Progress Report No. 12)

223.13 Debly, L. J.
STATIC TESTS ON PRESTRESSED CONCRETE BEAMS USING 7/16-IN. STRANDS, June 1956 (Progress Report No. 13)

223.14 Walther, R. E.
LATERAL LOAD DISTRIBUTION IN MULTI-BEAM BRIDGES, August 1956 (Progress Report No. 14)

223.15 Ekberg, C. E., Jr., Walther, R. E., and Slutter, R. G.
FATIGUE RESISTANCE OF PRESTRESSED CONCRETE BEAMS IN BENDING, April 1957 (Progress Report No. 15) (Published: Proceedings, American Society of Civil Engineers, Vol. 83, ST4, 1957)
(F. L. Reprint No. 57-9)

223.16 Dinsmore, G. A. and Deutsch, P. L.
ANCHORAGE CHARACTERISTICS OF STRAND IN PRETENSIONED PRESTRESSED CONCRETE, July 1957 (Progress Report No. 16)

223.17 Walther, R. E.
THE ULTIMATE STRENGTH OF PRESTRESSED AND CONVENTIONALLY REINFORCED CONCRETE UNDER THE COMBINED ACTION OF MOMENT AND SHEAR, October 1957 (Progress Report No. 17)

223.17A Walther, R. E.
SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS, November 1957 (Progress Report No. 17A)

223.18 Walther, R. E. and Warner, R. F.
ULTIMATE STRENGTH TESTS OF PRESTRESSED AND CONVENTIONALLY REINFORCED CONCRETE BEAMS IN COMBINED BENDING AND SHEAR, September 1958 (Progress Report No. 18)

Project 223 (Cont'd.)

223.19 Dinsmore, G. A., Deutsch, P. L., and Montemayor, J. L.
ANCHORAGE AND BOND IN PRE-TENSIONED PRE-STRESSED CONCRETE MEMBERS, December 1958 (Progress Report No. 19)

223.20 Warner, R. F.
THE CALCULATION OF FLEXURAL STRESSES IN A PRESTRESSED CONCRETE MEMBER, November 1958 (Progress Report No. 20)

223.21 Lane, R. E. and Ekberg, C. E., Jr.
REPEATED LOAD TESTS ON 7-WIRE PRESTRESSING STRANDS, January 1959 (Progress Report No. 21)

223.22 McClarnon, F. M., Wakabayashi, M., and Ekberg, C. E., Jr.
FURTHER INVESTIGATION INTO THE SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS WITHOUT WEB REINFORCEMENT, January 1962 (Progress Report No. 22)

223.23 Nasser, K. W.
STATIC AND FATIGUE TESTS OF A 30-FOOT COMPOSITE PRESTRESSED CONCRETE BEAM, March 1961 (Progress Report No. 23)

223.24 Warner, R. F.
PROBABLE FATIGUE LIFE OF PRESTRESSED CONCRETE FLEXURAL MEMBERS, Ph.D. Dissertation, Lehigh University, September 1961

223.24A Warner, R. F. and Hulsbos, C. L.
PROBABLE FATIGUE LIFE OF PRESTRESSED CONCRETE FLEXURAL MEMBERS, July 1962 (Progress Report No. 24)

223.24B Warner, R. F. and Hulsbos, C. L.
PROBABLE FATIGUE LIFE OF UNDER-REINFORCED PRESTRESSED CONCRETE BEAMS, (Published: Publications, International Association of Bridge and Structural Engineers, Vol. 22, 1962)
(F. L. Reprint No. 62-21)

223.25 Hanson, J. M. and Hulsbos, C. L.
OVERLOAD BEHAVIOR OF PRESTRESSED CONCRETE BEAMS WITH WEB REINFORCEMENT, February 1963 (Progress Report No. 25)

223.26 Ople, F. S., Jr.
PROBABLE FATIGUE LIFE OF CONCRETE WITH STRESS GRADIENT, Ph.D. Dissertation, Lehigh University, September 1963

Project 223 (Cont'd.)

223.26A — Ople, F. S., Jr. and Hulsbos, C. L.
PROBABLE LIFE OF PRESTRESSED BEAMS AS LIMITED BY CONCRETE FATIGUE, October 1963 (Progress Report No. 26)

223.26B — Ople, F. S., Jr. and Hulsbos, C. L.
PROBABLE FATIGUE LIFE OF PLAIN CONCRETE WITH STRESS GRADIENT, December 1963 (Published: Journal of the American Concrete Institute, Vol. 63, January 1966)
(F. L. Reprint No. 66-2)

223.27 — Hanson, J. M. and Hulsbos, C. L.
ULTIMATE SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS WITH WEB REINFORCEMENT, April 1965 (Progress Report No. 27)

223.27A — Hanson, J. M. and Hulsbos, C. L.
ULTIMATE SHEAR TESTS OF PRESTRESSED CONCRETE I-BEAMS UNDER CONCENTRATED AND UNIFORM LOADINGS, September 1963 (Published: Journal of the Prestressed Concrete Institute, Vol. 9, No. 3, June 1964)
(F. L. Reprint No. 64-14)

223.27B — Hanson, J. M.
ULTIMATE SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS WITH WEB REINFORCEMENT, Ph.D. Dissertation, Lehigh University, 1964

223.28 — Brecht, H. E., Hanson, J. M., and Hulsbos, C. L.
ULTIMATE SHEAR TESTS OF FULL-SIZED PRESTRESSED CONCRETE BEAMS, December 1965 (Progress Report No. 28)

223.28A — Brecht, H. E.
ULTIMATE SHEAR TESTS OF FULL-SIZED PRESTRESSED CONCRETE BEAMS, M.S. Thesis, Lehigh University, 1965

223.29 — Hanson, J. M. and Hulsbos, C. L.
SHEAR FATIGUE TESTS OF PRESTRESSED CONCRETE I-BEAMS WITH WEB REINFORCEMENT, January 1969 (Progress Report No. 29)

223 — Ekberg, C. E., Jr.
SUMMARY OF PRESTRESSED CONCRETE PROGRAM AT LEHIGH UNIVERSITY, Proceedings, World Conference on Prestressed Concrete, San Francisco, July 1957
(F. L. Reprint No. 57-18)

Project 223 (Cont'd.)

223.S4 Ekberg, C. E., Jr., Walther, R. E., and Slutter, R. G.
FATIGUE RESISTANCE OF PRESTRESSED CONCRETE BEAMS IN BENDING, Proceedings, American Society of Civil Engineers, Vol. 83 (ST4), 1957
(F. L. Reprint No. 57-9)

223.S6 Slutter, R. G. and Ekberg, C. E., Jr.
STATIC AND FATIGUE TESTS ON PRESTRESSED CONCRETE RAILWAY SLABS, American Railway Engineering Association Bulletin, Vol. 60, No. 544, June-July 1958
(F. L. Reprint No. 59-2)

223.S7 Walther, R. E.
THE SHEAR STRENGTH OF PRESTRESSED CONCRETE BEAMS, Proceedings, Third Congress, Federation Internationale de la Precontrainte, Berlin, 1958
(F. L. Reprint No. 58-5)

223.S8 Ekberg, C. E., Jr. and Warner, R. F.
PRESTRESSED CONCRETE RESEARCH AT LEHIGH UNIVERSITY, 1952-58, March 1959

223.S9 Nasser, K. W. and Ekberg, C. E., Jr.
STATIC AND FATIGUE TEST OF A 70-FOOT COMPOSITE PRESTRESSED CONCRETE BEAM, April 1959

223.S10 Assimocoupolos, B., Warner, R. F., and Ekberg, C. E., Jr.
HIGH SPEED FATIGUE TESTS ON SMALL SPECIMENS OF PLAIN CONCRETE, Journal of the Prestressed Concrete Institute, September 1959
(F. L. Reprint No. 59-15)

Project 229 PRESTRESSED CONCRETE BOND (WIRES)

229 El-Khuri, S. K.
BOND IN PRESTRESSED CONCRETE, July 1952

229.1 Buenaventura, C. V.
BOND OF WIRES IN PRESTRESSED CONCRETE, December 1953

Project 232	BOND OF PRESTRESSED CONCRETE (STRANDS)	
232.2	Brown, D. H. BOND OF PRESTRESSED STRANDS, September 1953	
Project 235	THE EFFECT OF PRESTRESSING OF CONCRETE COLUMNS IN THE ELASTIC RANGE	
235.1	Spalding, G. R. THE EFFECT OF PRESTRESS ON ELASTIC COLUMNS, June 1954	
Project 240	DYNAMIC TESTS OF PRESTRESSED CONCRETE RAILROAD SLABS	
240.S6	Slutter, R. G. and Ekberg, C. E., Jr. STATIC AND FATIGUE TESTS ON PRESTRESSED CONCRETE RAILWAY SLABS, American Railway Engineering Association Bulletin, Vol. 60, No. 544, June-July 1958 (F. L. Reprint No. 59-2)	
Project 252	CONTINUOUS CONCRETE PAVEMENTS (YORK)	
252.1	Schiffman, R. L., Taylor, I. J., and Eney, W. J. CONTINUOUSLY REINFORCED CONCRETE PAVEMENT RESEARCH IN PENNSYLVANIA, Highway Research Board Bulletin No. 181, January 1957 (F. L. Reprint No. 57-7)	
252.2	Project Staff CONTINUOUSLY REINFORCED CONCRETE PAVEMENT RESEARCH FOR AMERICAN IRON AND STEEL INSTITUTE, 1958	

Project 255 — TESTS OF LONG CONCRETE BEAMS

255.1 Ekberg, C. E., Jr.
TEST ON A 70-FOOT PRESTRESSED PRE-TENSIONED CONCRETE BEAM, September 1956

255.2 Ekberg, C. E., Jr.
DYNAMIC TESTS OF A 55-FOOT AMDEK BRIDGE MEMBER, March 1956

Project 256 — CONTINUOUS CONCRETE PAVEMENTS

256.1 Schiffman, R. L.
LITERATURE SURVEY ON RESEARCH IN CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS, 1957

256.2 Shieh, Ying-Jer
THEORETICAL ANALYSIS OF SPECIAL PROBLEMS OF THE CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS, 1958

256.3 Taylor, I. J. and Eney, W. J.
FIRST YEAR PERFORMANCE REPORT ON CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS IN PENNSYLVANIA, Highway Research Board Bulletin No. 214, 1959
(F. L. Reprint No. 59-5)

256.4 Yerlici, V. A.
AN EXPERIMENTAL STUDY ON THE INFLUENCE OF CONTINUOUS REINFORCEMENT ON THE CRACK PATTERN OF LONG CONCRETE PAVEMENTS, 1958

256.5 Taylor, I. J.
DEVELOPMENT OF CONTINUOUSLY REINFORCED CONCRETE HIGHWAY PAVEMENTS IN THE U. S., 1958

256.6 Yerlici, V. A.
NOTES ON THE POSSIBLE BAUSCHINGER EFFECT ON THE REINFORCEMENT STEEL IN A CONTINUOUSLY REINFORCED CONCRETE PAVEMENT, 1958

256.7 Crabtree, A.
THE SIGNIFICANCE OF TRANSVERSE CRACKS IN CONTINUOUSLY REINFORCED CONCRETE PAVEMENT, 1958

256.8 Taylor, I. J. and Eney, W. J.
OBSERVATION IN THE BEHAVIOR OF CONTINUOUSLY REINFORCED CONCRETE PAVEMENT IN PENNSYLVANIA, 1958

Project 256 (Cont'd.)

256.9 Taylor, I. J., Liebig, J. O., Jr., and Eney, W. J.
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT ON U. S. ROUTE 22, BERKS COUNTY, PENNSYLVANIA, February 1962

256.10 Cooper, Peter B.
REINFORCEMENT OVERLAP TESTS, September 1960

256.11 Taylor, I. J.
EXPERIMENTAL PAVEMENT ON U. S. ROUTE 111 IN YORK COUNTY, PENNSYLVANIA, March 1962

256.12 Kocaoglu, Dundar
AN INVESTIGATION OF OVERLAP FAILURES IN CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS, 1962.

256.13 Taylor, I. J.
SUPPLEMENTAL REPORT ON THE HAMBURG PROJECT, 1962

279 Culver, C. and Coston, R.
TESTS OF COMPOSITE BEAMS WITH STUD SHEAR CONNECTORS, February 1961 (Proceedings of American Society of Civil Engineers, Vol. 87, No. ST2)
(F. L. Reprint No. 61-3)

279.2 Culver, C., Zarzenczny, P. J., and Driscoll, G. C., Jr.
TESTS OF COMPOSITE BEAMS FOR BUILDINGS, June 1960 (Progress Report No. 1)

279.6 Culver, C., Zarzenczny, P. J., and Driscoll, G. C., Jr.
TESTS OF COMPOSITE BEAMS FOR BUILDINGS, January 1961 (Progress Report No. 2)

279.7 Culver, C.
THE MOMENT CURVATURE RELATIONS FOR COMPOSITE BEAMS, December 1960

279.9 Driscoll, G. C., Jr. and Slutter, R. G.
RESEARCH ON COMPOSITE DESIGN AT LEHIGH UNIVERSITY, 1961

279.10 Slutter, R. G. and Driscoll, G. C., Jr.
TEST RESULTS AND DESIGN RECOMMENDATIONS FOR COMPOSITE BEAMS IN BUILDINGS, January 1960

279.11 Slutter, R. G. and Driscoll, G. C., Jr.
PLASTIC DESIGN OF STEEL AND CONCRETE COMPOSITE BEAMS, October 1961

279.12 Slutter, R. G. and Driscoll, G. C., Jr.
ULTIMATE STRENGTH OF COMPOSITE MEMBERS, March 1962

279.13 Slutter, R. G. and Driscoll, G. C., Jr.
NOMENCLATURE FOR COMPOSITE STEEL AND CONCRETE BEAMS, March 1962

279.15 Slutter, R. G. and Driscoll, G. C., Jr.
FLEXURAL STRENGTH OF STEEL-CONCRETE COMPOSITE BEAMS, April 1965 (Proceedings, ASCE, Journal of the Structural Division, Vol. 91, No. ST2)
(F. L. Reprint No. 65-30)

279.15A Slutter, R. G. and Driscoll, G. C., Jr.
THE FLEXURAL STRENGTH OF STEEL-CONCRETE COMPOSITE BEAMS, December 1963

Project 282 — PREFLEXED BEAMS

282.1 — Errera, S. J., Pitts, C. P., and Haines, D. W. TESTS OF PREFLEXED BEAMS, September 1961

Project 285 — FATIGUE OF COMPOSITE BEAMS

285.1 — Slutter, R. G. and Driscoll, G. C., Jr. FATIGUE INVESTIGATION OF COMPOSITE BEAMS - PROPOSAL FOR FIRST SERIES OF TESTS, June 1961

285.2 — Slutter, R. G. PROPOSAL FOR PRELIMINARY BEAM TESTS, September 1961

285.3 — King, D. C., Slutter, R. G., and Driscoll, G. C., Jr. FATIGUE TESTS OF COMPOSITE BEAMS, March 1962

285.4 — Slutter, R. G., King, D. C., and Driscoll, G. C., Jr. FATIGUE STUDIES OF COMPOSITE STEEL AND CONCRETE BEAMS - PROPOSAL TO AISC COMMITTEE ON COMPOSITE DESIGN, April 1962

285.5 — Slutter, R. G, King, D. C., and Driscoll, G. C., Jr. PARTIAL TEST RESULTS; FATIGUE OF COMPOSITE BEAMS, April 1963

285.6 — Driscoll, G. C., Jr., King, D. C., and Slutter, R. G. FATIGUE STRENGTH OF SHEAR CONNECTORS IN COMPOSITE BEAMS, January 1964

285.6T — King, D. C. THE FATIGUE OF STUD SHEAR CONNECTORS, M.S. Thesis, Lehigh University, April 1963

285.6A — King, D. C., Slutter, R. G., and Driscoll, G. C., Jr. FATIGUE STRENGTH OF 1/2 IN. DIAMETER STUD SHEAR CONNECTORS, January 1965

285.8 — Slutter, R. G. A BRIEF SUMMARY OF FATIGUE TEST RESULTS ON COMPOSITE BEAMS, February 1964

Project 289		BAR-MAT LAP FAILURES IN PAVEMENTS
289.1	Adams, R. G. and VanHorn, D. A. REINFORCEMENT LAP FAILURES, September 1964	
Project 298		END CONDITIONS IN PRE-TENSIONED PRESTRESSED CONCRETE
298.2	Miller, D. M. and Hulsbos, C. L. AN INVESTIGATION OF CRACK OCCURRENCE IN THE END REGIONS OF PRE-TENSIONED PRESTRESSED CONCRETE BEAMS, February 1964	
Project 306		HORIZONTAL SHEAR CONNECTION IN COMPOSITE CONCRETE BEAMS
306.1	Badoux, J. C. and Hulsbos, C. L. HORIZONTAL SHEAR CONNECTION IN COMPOSITE CONCRETE BEAMS UNDER REPEATED LOADING, August 1965	
306.1D	Badoux, J. C. HORIZONTAL SHEAR CONNECTION IN COMPOSITE CONCRETE BEAMS UNDER REPEATED LOADING, Ph.D. Dissertation, Lehigh University, 1965	

Project 309

BOND BETWEEN CONCRETE AND PRESTRESSING STRAND

309.1 Badaliance, R. and VanHorn, D. A.
ULTIMATE FLEXURAL BOND IN BEAMS PRE-TENSIONED WITH HIGH STRENGTH STRAND, February 1966

309.1T Badaliance, R.
ULTIMATE FLEXURAL BOND BETWEEN CONCRETE AND PRESTRESSING STRAND, M.S. Thesis, Lehigh University, 1965

309.2 Tide, R. H. R. and VanHorn, D. A.
A STATISTICAL STUDY OF THE STATIC AND FATIGUE PROPERTIES OF HIGH STRENGTH PRESTRESSING STRAND, June 1966

309.2T Tide, R. H. R
A STATISTICAL STUDY OF THE STATIC AND FATIGUE PROPERTIES OF HIGH STRENGTH PRESTRESSING STRAND, M.S. Thesis, Lehigh University, 1966

309.3 Cowen, S. H. and VanHorn, D. A.
END SUPPORT EFFECTS ON ULTIMATE FLEXURAL BOND IN PRE-TENSIONED BEAMS, January 1967

309.3T Cowen, S. H.
END SUPPORT EFFECTS ON ULTIMATE FLEXURAL BOND IN PRE-TENSIONED BEAMS, M.S. Thesis, Lehigh University, 1967

309.4 Adams, R. G. and VanHorn, D. A.
REPEATED LOAD EFFECTS ON ULTIMATE FLEXURAL BOND IN PRE-TENSIONED FLEXURAL MEMBERS,

Project 315

LATERAL LOAD DISTRIBUTION ON CONCRETE BRIDGES

315.1 Douglas, W. J. and VanHorn, D. A.
LATERAL DISTRIBUTION OF STATIC LOADS IN A PRESTRESSED CONCRETE BOX-BEAM BRIDGE - DREHERSVILLE BRIDGE, August 1966

315.1T Douglas, W. J.
LATERAL DISTRIBUTION OF STATIC LOADS IN A PRESTRESSED CONCRETE BOX-GIRDER BRIDGE, M.S. Thesis, Lehigh University, 1966

315.2 Guilford, A. A. and VanHorn, D. A.
LATERAL DISTRIBUTION OF DYNAMIC LOADS IN A PRESTRESSED CONCRETE BOX-BEAM BRIDGE - DREHERSVILLE BRIDGE, February 1967

315.3 Kilmer, R. H.
LOAD DISTRIBUTION IN BOX-BEAM BRIDGES - COMPUTER DESIGN OF PRESTRESSED CONCRETE MEMBERS, M.S. Thesis, Lehigh University, 1966

315.4 Guilford, A. A. and VanHorn, D. A.
LATERAL DISTRIBUTION OF VEHICULAR LOADS IN A PRESTRESSED CONCRETE BOX-BEAM BRIDGE - BERWICK BRIDGE, October 1967

315.4ST Varney, R. F.
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No report to date

PART III - PUBLICATIONS

The publications are listed in chronological order, and include all published papers based on the projects listed in Part II. Reprints are available in limited quantities on request. After each reference, a Fritz Laboratory reprint number is given.

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